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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/647,535      | 08/26/2003  | Stefan Kaufmann      | 32140-190940        | 2271             |

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EXAMINER

BAREFORD, KATHERINE A

ART UNIT PAPER NUMBER

1762

DATE MAILED: 10/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/647,535

Applicant(s)

KAUFMANN, STEFAN

Examiner

Katherine A. Bareford

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address.

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/04</u> . | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### *Claim Objections*

1. Claim 1 and 5 are objected to because of the following informalities: (1) in claim 1, line 4, the second comma should be removed after "barrel". (2) in claim 1, lines 8-9, "a gun barrel" should be "the gun barrel" to provide proper antecedent reference to the previously listed gun barrel. (3) in claim 5, there is not proper antecedent basis in claim 1 for "the moving" to refer to the plasma jet and leaser beam.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnecke (US 2001/0051226) in view of Heinemann et al (US 2002/0025386).

Warnecke teaches a method of coating the inside of a gun barrel. Figure 2 and paragraph [0006]. The inside surface of the gun barrel is to be provided with a layer of high melting temperature coating material for reducing erosion of the gun barrel. Paragraphs [0005] and [0009]. A plasma jet spray device is provided. Paragraphs [0006] and [0017]. The plasma spray

device is moved along the interior of the gun barrel. Paragraphs [0006] and [0020]. The coating layer material is applied to an inside surface of the gun barrel through use of the plasma jet spraying device. Paragraph [0006]. The spray provides a molten bath containing melted gun barrel material and the coating layer material in a near surface region of the barrel that is being coated. Figure 2 and paragraph [0018]. Thereafter, the bath is permitted to harden. Paragraph [0021] (note that after coating the material has hardened).

Claim 4: moving of the plasma spray device takes place in at least an axial direction of the gun barrel. Paragraph [0006].

Claim 5: the moving of the plasma spray device can follow a helical path relative to the gun barrel. Paragraph [0020].

Claims 6-7: the layer thickness applied after the plasma spray can be 0.5 to 1.5 mm. Paragraph [0024].

Warnecke teaches all the features of these claims except the features of the use of the laser beam in combination with the plasma spraying.

However, Heinemann teaches the applying of a coating to an inside surface of a cylindrically shaped component. Figures 1-2, paragraphs [0007] and [0049]. The coating is applied by thermal spraying, such as by plasma spraying. Paragraphs [0015] and [0049]. Heinemann teaches that to achieve increased penetration depth, improved introduction of the applied material into the component, and improved bonding of the material which is applied by thermal spraying, a simultaneous laser treatment is provided. Paragraph [0013]. The laser treatment is provided simultaneously with the plasma spraying, whereby the laser is directed at a

region in front of the plasma spray point, at the plasma spray point or behind the plasma spray point. Paragraphs [0008]—[0011] and figures 1-2. As a result, the laser beam can be directed at a focal point of the plasma jet (that is, at the plasma spray point of application). Paragraph [0010]. The laser beam can also be directed directly in front of the plasma jet in the direction of movement. Figure 2 and paragraphs [0010] and [0050]. The laser beam can be coupled to the plasma jet device so that it acts in concert with the plasma jet device. Paragraphs [0032]—[0036]. The desired melt depth, diameter of the substrate, and other factors can be controlled. See paragraph [0051].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Warnecke to provide the simultaneous use of a laser treatment during the plasma spray as suggested by Heinemann so as to provide for increased penetration depth, improved introduction of the applied material into the component, and improved bonding of the material which is applied by plasma spraying, because Warnecke teaches plasma spraying a coating on the inside of a cylindrical substrate, a gun barrel, and Heinemann teaches that when plasma spraying a coating on the inside of a cylindrical substrate, increased penetration depth, improved introduction of the applied material into the component, and improved bonding of the material which is applied by plasma spraying, is provided when a simultaneous laser treatment is used. Heinemann teaches that the laser treatment can be directed at a focal point of the plasma jet (that is, at the plasma spray point of application), and that the laser beam can also be directed directly in front of the plasma jet in the direction of movement. The depth of melting heat on the inside surface of the gun barrel would desirably be set to less than 1 mm, because Warnecke

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teaches a coating thickness of 0.5 mm for example and that only the near surface of the substrate is melted. The hardening would be carried out due to movement of the laser and plasma spray jet from a region of the molten bath, because these devices are providing the heat of melting. The movement of the laser beam would be continuous, because Warneke describes a continuous axis movement of the plasma jet and Heinemann teaches coupling the laser device to the plasma jet device.

4. Warnecke (US 2002/00114899) teaches using a laser to coat the inner surface of a weapon barrel. See the abstract.

#### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:30-4:00) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (571) 272-1415. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
KATHERINE BAREFORD  
PRIMARY EXAMINER